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Claims

WHAT IS CLAIMED IS:

1. (amended) A method of pumping a wide bandwidth optical parametric oscillator to provide mid-IR radiation, comprising the step of pumping the optical parametric oscillator with a Thulium laser using a laser wavelength of about 2 microns and operating by itself as the a pump source for the optical parametric oscillator, wherein the optical parametric oscillator includes a zinc germanium phosphide non-linear crystal.
2. (original) The method of Claim 1, wherein the Thulium laser utilizes a YAlO_3 host.
3. (cancelled)
4. (original) The method of Claim 1, wherein the Thulium laser is Q-switched.
5. (amended) A method of pumping an optical parametric oscillator without utilizing Holmium, comprising the step of pumping the optical parametric oscillator with a Thulium laser using a laser wavelength of about 2 microns output, wherein the optical parametric oscillator includes a zinc germanium phosphide crystal.
6. (cancelled)
7. (cancelled)

8. (cancelled)

9. (amended) Apparatus for generating infrared radiation, comprising the combination of:

a Thulium laser using a laser wavelength of about 2 microns; and,

an optical parametric oscillator pumped by said Thulium laser, wherein said optical parametric oscillator is in the form of a ring.

10. (original) The apparatus of Claim 9, wherein said Thulium laser is a Tm:YAlO₃ laser.

11. (original) The apparatus of Claim 9, wherein said optical parametric oscillator includes a ZnGeP₂ non-linear crystal.

12. (cancelled)

13. (amended) The apparatus of Claim ~~12~~9, wherein said optical parametric oscillator includes two ZnGeP₂ non-linear crystals.

14. (amended) The apparatus of Claim ~~14~~9, wherein said optical parametric oscillator is in the form of a linear resonator.

15. (original) The apparatus of Claim 9, wherein said optical parametric oscillator is doubly resonant.

16. (original) The apparatus of Claim 9, wherein said optical parametric oscillator has a non-linear crystal selected from the group consisting of zinc germanium phosphide, silver gallium selenide, silver gallium indium selenide, gallium arsenide and lithium niobate crystals.

17. (original) The apparatus of Claim 9, wherein said Thulium laser is selected from the group consisting of YAG, YSGG, YALO, LuAG, YLF, Y_2O_3 and YVO_4 Thulium lasers.

18. (original) The apparatus of Claim 9, wherein the optical parametric oscillator has a non-linear crystal selected from the group consisting of $ZnGeP_2$, $AgGaSe_2$, AGIS, $AgGaS_2$, OPCaAs and PPLN non-linear crystals.

19. (new) Apparatus for generating infrared radiation, comprising the combination of:
a Thulium laser using a laser wavelength of about 2 microns; and,
an optical parametric oscillator pumped by said Thulium laser, herein said optical parametric oscillator is double resonant.

20. (new) The apparatus of Claim 19, wherein said Thulium laser is a $Tm:YAlO_3$ laser.

21. (new) The apparatus of Claim 19, wherein said optical parametric oscillator includes a ZnGeP_2 non-linear crystal.

22. (new) The apparatus of Claim 21, wherein said optical parametric oscillator is in the form of a ring.

23. (new) The apparatus of Claim 22, wherein said optical parametric oscillator includes two ZnGeP_2 non-linear crystals.

24. (new) The apparatus of Claim 21, wherein said optical parametric oscillator is in the form of a linear resonator.